change the coefficient of a^2y^2 from 96 to 100 the equation represents the straight lines $y = \pm x$ and the circle $x^2 + y^2 = 100$, to which system of lines the curve is therefore closely asymptotic. I conjecture that the curve was originated in this way and has not heretofore been known as a geometrical locus. Can any of your readers throw any light on the history of this curious curve and its startling title?

Answer to Prof. Hall's Query, by Prof. W. W. Johnson.

Prof. Cayley proposed the question "Find the number of regions into which infinite space is divided by n planes" in the Smith Prize Examination Feb. 3rd, 1874, and published in the Mathematical Messenger for march 1874, "Solutions and remarks" on the paper of that day. He says he intended the questson for a problem, as the result, though a known, is not a generally known one. His solution is substantially as follows: Consider the analogous problem for lines in a plane. An additional line adds to the number of regions one for every part into which it is itself divided by the other lines. Hence, 1, 2, 3, 4 &c. lines divide a plane into 2, $2+2(=4)$, $4+3(=7)$, $7+4(=11)$ &c. regions; the general term being $\frac{1}{2}(n^2+n+2)$. In like manner an additional plane adds to the number of regions in space one for every region in to which it is itself divided by the other planes. Hence 1, 2, 3, 4, &c. planes divide space into 2, $2+2(=4)$, $4+4(=8)$, $8+7(=15)$, $15+11(=26)$ &c. regions; the general term being $\frac{1}{6}(n^3 + 5n + 6)$.

[Mr. G. W. Hill obtains the same result as answer to Prof. Hall's Query and by analogous reasoning, employing however in his investigation the Calculus of Finite Differences.

It will be observed that the question as proposed by Prof. Cayley is not identical with that proposed by Prof. Hall; as Prof. Cayley requests the number of regions into which infinite space *is* divided by n planes, whereas Prof. Hall asks, "Into how many parts *can* n planes divide space."

That the answer given is not *necessarily* the answer to Prof. Cayley's question follows from the fact that nothing in Prof. Cayley's announcement of the question precludes the possibility (theoretically at least) of some or all of the planes being parallel, in which case the answer would obviously not be correct: If drawn at random, however, the probability of such a contingency is infinitely small.—Ed.]

Answer to President Tappan's Query, by Prof. J. Scheffer.

It is. The French mathematician *Fermat* who published quite a number of theorems in regard to prime numbers, erroneously asserted that all the

numbers which have the form $a^m + 1$, in which m is a power of 2, are prime numbers. He declared himself unable to give a demonstration, but he was nevertheless convinced of the truth of his assertion. The latter is correct for all numbers not exceeding five figures; for instance, 2^2+1, 2^4+1, 2^8+1, $2^{16}+1$ ($=5, 17, 257, 65537$). But $2^{32}+1=4294967297$ is no longer a prime, for, as *Euler* has proved, it is divisible by 641.

[This Query was also answered in the affirmative by G. W. Hill, Prof. Chase, Judge Scott, E. S. Farrow, O. D. Oathout, E. B. Seitz and Henry Gunder.]

SOLUTION OF MR. HOLBROOK'S PROBLEM, (P. 72) BY PROF. H. T. EDDY.

Suppose the surface to be generated by the line

$$\frac{x-x_1}{x_2-x_1}=\frac{y-y_1}{y_2-y_1}=\frac{z-z_1}{z_2-z_1}. \quad \ldots\ldots\ldots\ldots (a)$$

Let the surface have a distance of $2r$ along the axis of x for its edge and the ellipse

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, \qquad z=c, \quad \ldots\ldots\ldots\ldots (b)$$

for its base, and the axis of z for its conical axis. Then if the point (x_1, y_1, z_1) is situated on the axis of x and (x_2, y_2, z_2) upon the ellipse the problem evidently requires $x_1 : r :: x_2 : a$. $\therefore x_2=\frac{ax_1}{r}. \quad \ldots\ldots\ldots\ldots (c)$

Also $\quad y_1=0, \qquad z_1=0, \qquad z_2=c, \qquad$ and from (b),

$$y_2=\frac{b}{a}\sqrt{a^2-x_2{}^2}. \quad \therefore \text{ from } (c),\ y_2=\frac{b}{r}\sqrt{a^2-x_1{}^2}.$$

$\therefore$ from (a),

$$\frac{r(x-x_1)}{x_1(a-r)}=\frac{ry}{b\sqrt{(a^2-x_1{}^2)}}=\frac{z}{c}. \quad \ldots\ldots\ldots\ldots (d)$$

$$\therefore \qquad x_1=\frac{x}{\frac{z}{c}\left(\frac{a}{r}-1\right)+1}.$$

Substitute this value of x_1 in the last of equations (d) and we get

$$\frac{y}{b}=\frac{z}{c}\left[1-\frac{x^2}{r^2\left[\frac{z}{c}\left(\frac{a}{r}-1\right)+1\right]^2}\right]^{\frac{1}{2}} \quad \ldots\ldots\ldots (e)$$

which is the equation sought.

If in (e) $a=b=r$ then $cy=z\sqrt{(r^2-x^2)}$ which is the equation of Wallis' cono-cuneus, having a circular base and an edge equal to the diameter of the base. If in (e) $r=0$ then we have

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=0$$

which is the equation of an elliptic cone.